of building chimney-tops may be classed nearly the whole genus of metallic addenda which misdirected ingenuity has devised. Were it not that their name is legion, we would have taken pleasure in giving diagrams of the chief of them, and in rendering transparent their fallacy. We must, however, content ourselves with a passing remark that there is but one species of this numerous family that possesses any claim to notice: the rest are all equally as absurd and erroneous in principle as they are outrageous to all rules of architectural symmetry. And even this one—the revolving hood or cowl—is unnecessary, as we will hereafter show; and quite as unsightly as any other of its kindred.

The *size* of chimneys, i.e., their transverse sectional area, is a point of equal, or even of greater importance than that of form; and it is therefore most advisable that we clearly understand the nature of its relation to the action of chimneys. As we have already remarked, a chimney is a tube, and is subject to the same physical laws as any other tube used for conveying fluids. Now the flow of fluids through tubes is proportional to the velocity of the fluid and the transverse sectional area of the tube,—i.e., if a tube of a given area passes a certain quantity of fluid through it at a given velocity in a given time, and it be required to pass the same quantity of fluid through another tube of only half the area, in the same time, we must increase the velocity of the fluid in a suitable proportion, and the required result will follow. Let us further exemplify this principle by referring to the action of a 9-inch flue, the sectional area of which is 81 square inches; and suppose a current of smoke passing through it at a velocity of 10 feet per second, and carrying off thereby 38·75 cubic feet of smoke per minute: the same flue reduced to an area of 40·5 square inches, would only carry off 19·375 cubic feet per minute at the same velocity of current, viz., 10 feet per second. In order, then, to carry off the former quantity, 38·75 cubic feet per minute, with the reduced area, we must increase the velocity of the current to double its former velocity, viz., to 20 feet per second.

We have practical demonstration of these facts in the case of all chimneys in which an accumulation of carbonaceous matter or soot takes place. For instance, the flue of an ordinary chimney, which we will suppose to be perfect in its action in every respect when quite clear, and capable of carrying off 20 cubic feet of smoke per minute, in course of time becomes virtually reduced in area, by the accumulation of soot, until it is only three-fourths of its original size; and as the velocity of the current or "draught" capable of being generated by the fire, as already explained, remains the same, it follows that only three-fourths of the smoke, i.e. 15 cubic feet per minute, can be carried off, and the remaining 5 cubic feet per minute, of course, back into the room, and the chimney then "smokes for want of sweeping." The sweep is sent for; the area of the chimney is restored to its original proportions by the removal of the soot; and, the velocity of the current still remaining the same, the flue again becomes equal to its task of carrying off the 20 cubic feet per minute.

At page 3, vol. ix., we showed that a long chimney produces naturally, a greater velocity of current or "draught" than a short one, all other things being equal. A long chimney will, therefore, carry off a greater quantity of smoke in a given time than a short one, their sectional areas being the same; and hence we often find that a third-floor chimney "smokes," whilst that of the ground-floor is faultless, although the two may be similar in every respect except their lengths.

The *form* and *size* of the fireplace or opening into a chimney constitute a question of such importance as to merit especial consideration. We have seen (page 518, vol. viii.) that the rarefaction of air, which we will here repeat, is the primary cause of the action of chimneys, is produced by the air being brought into contact with the fire; and it must, therefore, be obvious that the closer the air entering a chimney can be brought to the fire the more perfect will be the rarefaction, and consequently the greater will be the velocity of the current or "draught." We see this fact fully exemplified in the action of air-furnaces—a [illegible]—where, in consequence of *all* the air passing into the chimney having first to pass *through* the fire, rarefaction is produced in the highest degree; and the current or "draught" becomes so rapid and powerful as to be equal in effect to a blast produced by mechanical appliances, as that of a fan-blower, or a pair of smith's bellows.

The *form* and *size*, or area, usually given to fireplaces seem almost to have been devised for the purpose of defeating the important operation of rarefaction, by admitting too large a proportion of air that has not been in immediate contact with the fire. The sectional area of the opening of an ordinary fireplace as at present constructed is generally from eight to ten times that of the chimney; and the top of the opening is usually so far distant from the fire that the air enters at that point at a temperature not much above that of the atmosphere, whereas it ought not to be less than from 100 deg. to 150 deg. Fahrenheit.

In order more fully to establish the importance of the form and size of fireplaces in relation to the question of rarefaction, we will compare the effects of different sized openings by aid of the diagrams, fig. 14, where A and B

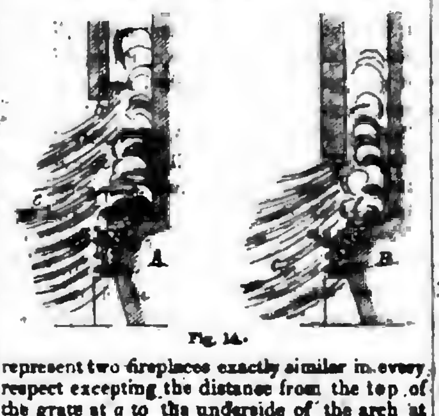

Fig. 14.

represent two fireplaces exactly similar in every respect excepting the distance from the top of the grate at *a* to the underside of the arch at *b*, that of A being nearly double the distance of the other. Suppose *c* and *c* to represent the currents of atmospheric air flowing into the chimney, and it will at once be seen that a greater quantity of cold air would pass into A than into B; and therefore the rarefaction in A would be the least perfect of the two. But if we attach a plate or board to the front of the fireplace B as at C, fig. 15, so as to cover

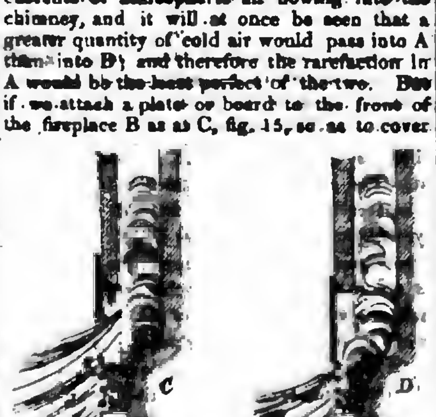

Fig. 15.

half the opening *a b*, it will readily be perceived that the proportion of the currents of cold air *d* passing the fire without being raised in temperature, would be smaller than in either of the previous cases; and the rarefaction would be proportionally more perfect. By closing the opening altogether, as at D, the current of air would be obliged to pass *through* the fire, and it would therefore become rarefied to the highest degree that this form of firegrate is capable of. This however, is unnecessary, as the degree of rarefaction produced would involve a consumption of fuel which, for ordinary purposes, would be excessive. The experiment can be tried very simply, and with little trouble, by placing any ordinary piece of deal board over the openings, and it serves to establish the truth of the following proposition, viz. the greater the area of the opening of the fireplace or firegrate the more likelihood is there of the chimney "smoking" for want of sufficient current or "draught," and *vice versâ*.

Tha.

A DESCRIPTION OF THE ANTIQUITIES OF POLA, IN ISTRIA.*

The Paper on the Architectural Remains of the Roman Provinces, read at the commencement of this Session, recommends the examination of some of the Roman provincial towns in addition to that of the eternal city; and it reminds us in the sequel, that in Dalmatia and Istria, among other provinces of the empire, monuments of much interest are to be found.

It is to the remains of a city in the last-named province, that attention is now invited; and a short notice of the town, its history, and its monuments, may, perhaps, be acceptable, though the subject is without pretensions to novelty, and has already been fully treated by many well-known architectural writers. As it is, however, only recently that facility of access to the district in which these remains are situated, has been afforded by the establishment of Steam Navigation along the coasts of the Adriatic, many now present may not have visited Pola in Istria, and to them the opportunity is afforded of obtaining a correct idea of these antiquities, and of judging how far they are worthy of examination among the numerous other objects of interest, presented in the course of foreign travel.

The town of Pola is situated at the head of a deep and capacious land-locked bay, near the southern extremity of the Istrian peninsula, in a position to which in ancient times it was greatly indebted for its maritime importance, and to which it still owes its imposing appearance when viewed from the harbour. On entering the bay, says Allason, the magnificent amphitheatre burst upon our view. Taken in all its circumstances, it is an object which has no rival among those remains of former times which attract the researches of the antiquarian traveller.

Like most places which have any claims to antiquity, its history commences in the regions of fable, and claims for its founders the emissaries despatched by Æetes in search of Medea, after her flight from Colchis. Under this tradition may perhaps be typified the migration of a Thracian race from a peninsula called Istria, at the mouths of the Danube, who may have given to their new location the name which previously designated the land of their birth.

The natural advantages of the port may have induced the Istrians to build Pola; at any rate, the inhabitants soon became adventurous navigators, but at the same time addicted to piratical enterprises, for which, and their innate ferocity, they rendered themselves but too notorious. Their lawless proceedings brought them into collision with the Romans about the year 180 B.C., by whom Istria was ultimately subjugated, and a colony founded in Pola to resist the attacks of the Liburnians and Dalmatians. Its maritime importance was meanwhile not neglected, and a lively intercourse was kept up by sea with Ancona, Ravenna, and the rising town of Aquileia. Having taken the republican side in the civil war subsequent on the death of Cæsar, it was besieged and dismantled by Augustus, 42 B.C., and afterwards bestowed as a reward on his soldiers after the battle of Philippi, when it was restored under the name of Julia Pietas. The fortunate position of the town on the great lines of communication between Rome, Aquileia, Constantinople, and the different parts of the empire, added to the natural advantages of its soil and climate, advanced it to a high state of prosperity in the time of the Antonines, 161—172 of our era. Taking the capacity of the amphitheatre to represent the amount of the population, we may conclude that Pola contained 25,000 inhabitants in the first century of the Christian era; but as its

* Read by Mr. C. C. Nelson, Fellow, at the Ordinary Meeting of the Institute of Architects, April 7.